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A STUDY OF CROP YIELDS

IN ALBERTA

by

H.K. Scott

Economics Division Marketing Service

Canada Department of Agriculture

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A STUDY OF CROP YIELDS IN ALBERTA

This report presents a mapping of differences in the productivity of agricultural land of Alberta. The productivity differences are described and discussed in terms of long-term average yields of the principal cash crop, wheat. Whenever possible comparable yields of oats and barley are also analyzed.

A Generalized Zoning of Productivity Differences

The mapping of differences in productivity consists of a cartographic or generalized zonation of Alberta. The zones are delineated in such a manner as to display the variations in average long-term wheat yields among different areas of the province.

Yields vary because of differences in quality and volume of inputs and also because of differences in weather conditions, soil types, and crop management. However important the management factor may be, when large areas composed of thousands of farms each are compared, there is no basis for saying that the farm operators in one area are better than the farm operators in another large area. We will not be mapping then, management differences. Soils vary as the five factors which determine soil characteristics vary. These five factors are: climate, vegetation, parent material, topography, and age of the soil. The age of the soil in the different zones which will be delineated can be generally considered as the same due to the size of the areas tending to compensate for the differences that occur in smaller areas. The local differences in topography and parent material that do exist in our agricultural soils will also tend to be averaged out by the areal size of our portrayed zones. The two factors which will vary with our productivity zones will be climate and native vegetation. Since the native vegetation is generally determined by climate then our cartographic generalization of Alberta on the basis of long-term wheat yield is actually a climatic zonation.

The material assembled in this report will likely be used for many different purposes but most people will use it as an indicator of differences in physical productivity among geographical areas. Buyers of agricultural land will use it for more accurate forecasts of crop yields in various parts of the province. More realistic comparisons of farm values will be made by considering differences in crop yield trends among areas. A comparative analysis of yield variations, from year to year and area to area, would also help devise a more equitable land taxation system, and establish a general basis for the determination of the size of agricultural loans.

Regardless of the type of use, the budgeting should be followed in the description of differences among areas. In preparing these budgets, consideration should be given to the variations in costs associated with variations in crop yields and wheat grades. (lower yields are generally

secured in areas that do, proportionately more summerfallowing than areas of high yields). In this report, yield data are based on typical cropping practices. No attempt is made to keep the differences in summerfallowing practices uniform or constant throughout the various geographical areas.

Yield Differences within Zones

Broad similarities will be delineated on our maps, according to distinct separate zones. till, one must not forget about variations within the zones themselves. Soils, climate and farm management all vary among small areas within a given zone. Soils and farm management, in particular, may vary, and sometimes widely, from one farm to another, even in the smallest of areas.

Attention may here be drawn to data from a 1948 study, data pertaining to 33 farms on loam soils in the Bow Island-Medicine Hat area of southern Alberta. The zoning of this area was made according to the long-term average wheat yields per acre, yields which ranged from ten to 12 bushels. Of the 33 farm operators from whom data were obtained 15 estimated that their long-term (1928-47) average wheat yields were from 7.6 to 10.5 bushels per acre. The others thought that their yields deviated from this estimate and ranged from four to 18.6 bushels per acre (Table 1).

Table 1.- Distribution of estimated long-term (1928-47) wheat yields on 33 loam soil farms, Bow Island - Medicine Hat Area, Alberta.

Range of average wheat yields	Number of farms	Percentage of farms
- bushels -		
1.6 - 4.5	1	3
4.6 - 7.5	4	12
7.6 - 10.5	15	46
10.6 - 13.5	6	18
13.6 - 16.5	5	15
16.6 - 19.5	2	6

The average of the 33 estimates was 10.6 bushels which is about the same as on our zonation map. However, the average distribution of the individual estimates has been weighted more by the higher individual estimates than by the more closely grouped but lower estimates. The range is due to variations in inputs and estimating errors. The modal or most common class of long-term estimates is the 7.6 - 10.5 bushel class. The whole distribution does exemplify the type of variation from the average of long-term yields that can be expected for a group of individual farm yields.

Wheat Yield Estimates used as a Basis for Zonation

Long-term published crop yield data may not be adequate for a satisfactory yield zonation of Alberta. The best available data are probably those compiled by the Sanford Evans Statistical Service. 1/ These data were used in the construction of our zonation map. Estimated average wheat yields for areas adjacent to 404 shipping points in Alberta were available for the 26-year period from 1925 to 1950 inclusive. These estimates include about 10,000 individual annual estimates. Data for comparable oats and barley average yields, although more limited, were available for the 1927-1940 period.

Information on wheat yield averages, by Census divisions, was also available from the Alberta Department of Agriculture, for the 1925-50 period. Crop districts for which data are often released have boundaries similar to those of the Census divisions. The data analyzed in the latter part of this report are concerned with the yield characteristics of the 17 census divisions.

The average wheat yield fluctuated between a high of 28.0 bushels in 1923 to a low of 8.8 bushels per acre in 1936 during the 1921-52 period (Figure 1). The average yield was 17.4 bushels per acre. The lowest average annual yield was 8.6 bushels below and the highest one 10.6 bushels above the 32-year average. (The average deviation from the 32-year average of the 16 yearly averages above and the 16 yearly averages below was only 4.3 bushels.) The year-to-year fluctuations from the average long-term yield per acre averaged slightly more than four bushels per acre; half of the years had yields above and the other half yields below the long-term average. (When considered as a percentage of the 32-year mean, the average deviation or coefficient of variability amounted to 24.8 per cent).

Data on wheat yields, by shipping point areas, were not available for the years 1921-24 inclusive. So, our zonation of the province had to be based on data beginning with 1925. Moreover, as high yields infrequently occur in two or more consecutive years, data for 1951 and 1952 were deleted from our calculations. The inclusion of these data would have resulted in a higher figure for average yields.

Construction of the Zonation Map

For a meaningful discussion of differences among geographical areas it was necessary to delineate areas with similar productivity characteristics. The 404 shipping points for which yield data were available were plotted on a base map. The 26-year average wheat yields for each of these points

1/ "Appraisers Manual of Grain Yields, 1925 - 1940". Sanford-Evans Statistical Service, Winnipeg, Canada.

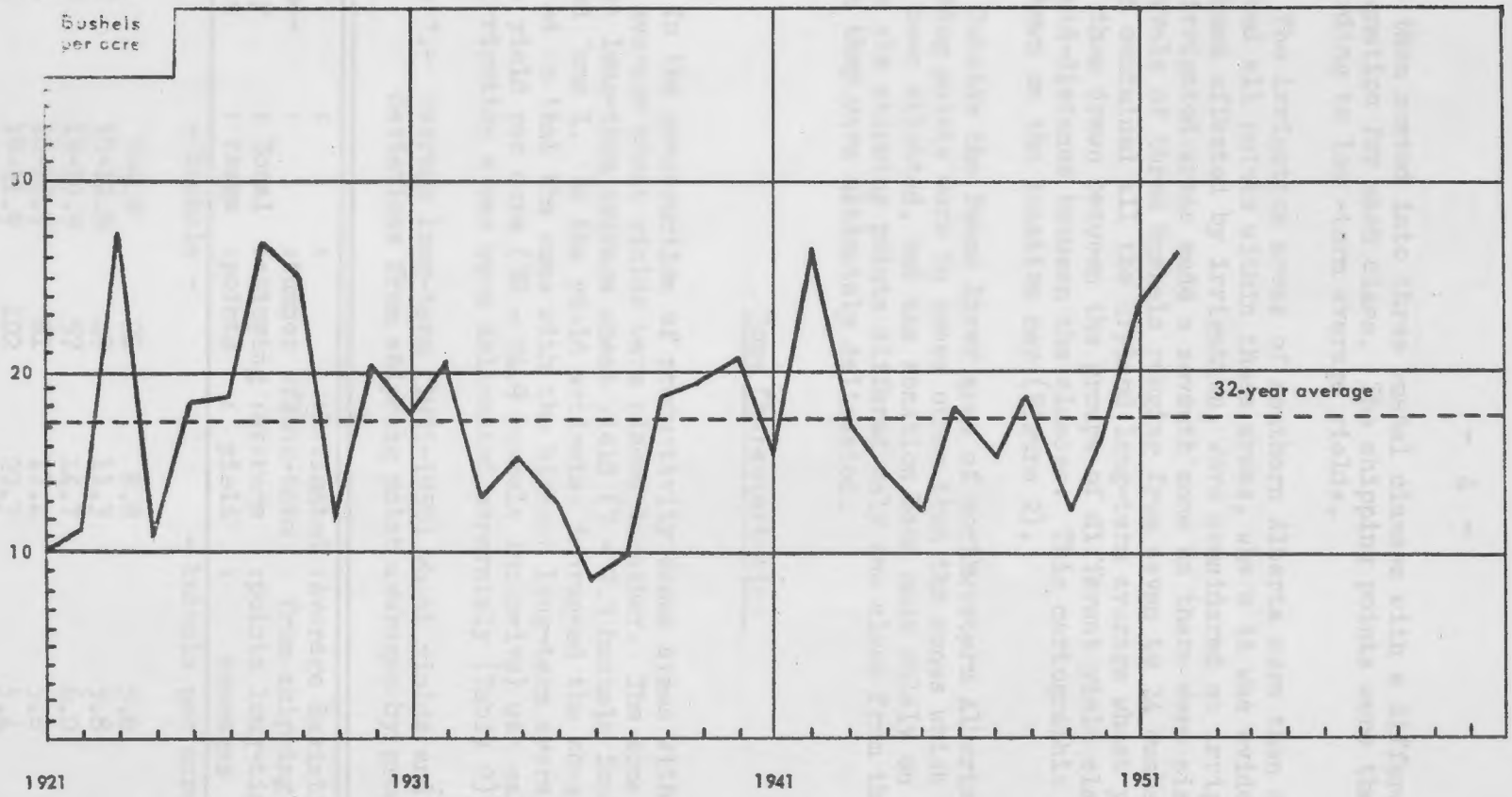

Figure 1. – Average annual wheat yields, Alberta, 1921-1952.

were then sorted into three bushel classes with a different kind of designation for each class. The shipping points were then indicated according to long-term average yields.

The irrigation areas of southern Alberta were then drawn onto the map and all points within these areas, where it was evident that yields had been affected by irrigation, were considered as irrigation points. The irrigated areas made a seventh zone as there were six classes with intervals of three bushels ranging from seven to 24 bushels inclusive, which contained all the dryland long-term average wheat yields. Lines were then drawn between the groups of different yield classes at about the mid-distance between the classes. This cartographic presentation is shown on the zonation map (Figure 2).

Outside the Peace River area of northwestern Alberta, only six shipping points were in zones other than the zones which they would have been allotted, had the zonation been made solely on a yield basis. These six shipping points differed only one class from the zone in which they were ultimately delineated.

Zone Characteristics

In the construction of productivity zones areas with similar long-term average wheat yields were placed together. The zone with the lowest long-term average wheat yield (7 - 9.9 bushels inclusive) was called Zone 1. As the yield estimates increased the zone number increased so that the zone with the highest long-term average dryland wheat yield per acre (22 - 24.9 bushels inclusive) was called Zone 6. The irrigation areas were delineated separately (Table 2).

Table 2.- Average long-term (1925-1950) wheat yields and annual deviations from shipping point averages by productivity zones.

Productivity zone	Zonal range	Number of shipping points	Estimated long-term average yield	Average deviation from shipping points long-time averages	Coefficient of variability
	- bushels -			- bushels per acre -	- per cent -
1	7-9.9	21	8.8	5.6	63.6
2	10-12.9	49	11.3	5.8	51.3
3	13-15.9	57	14.7	6.0	40.8
4	16-18.9	81	17.4	5.8	33.3
5	19-21.9	102	20.3	5.4	26.6
6	22-24.9	36	23.1	5.4	23.4
Irrigation	18.5-26.5	12	21.9	3.7	16.4

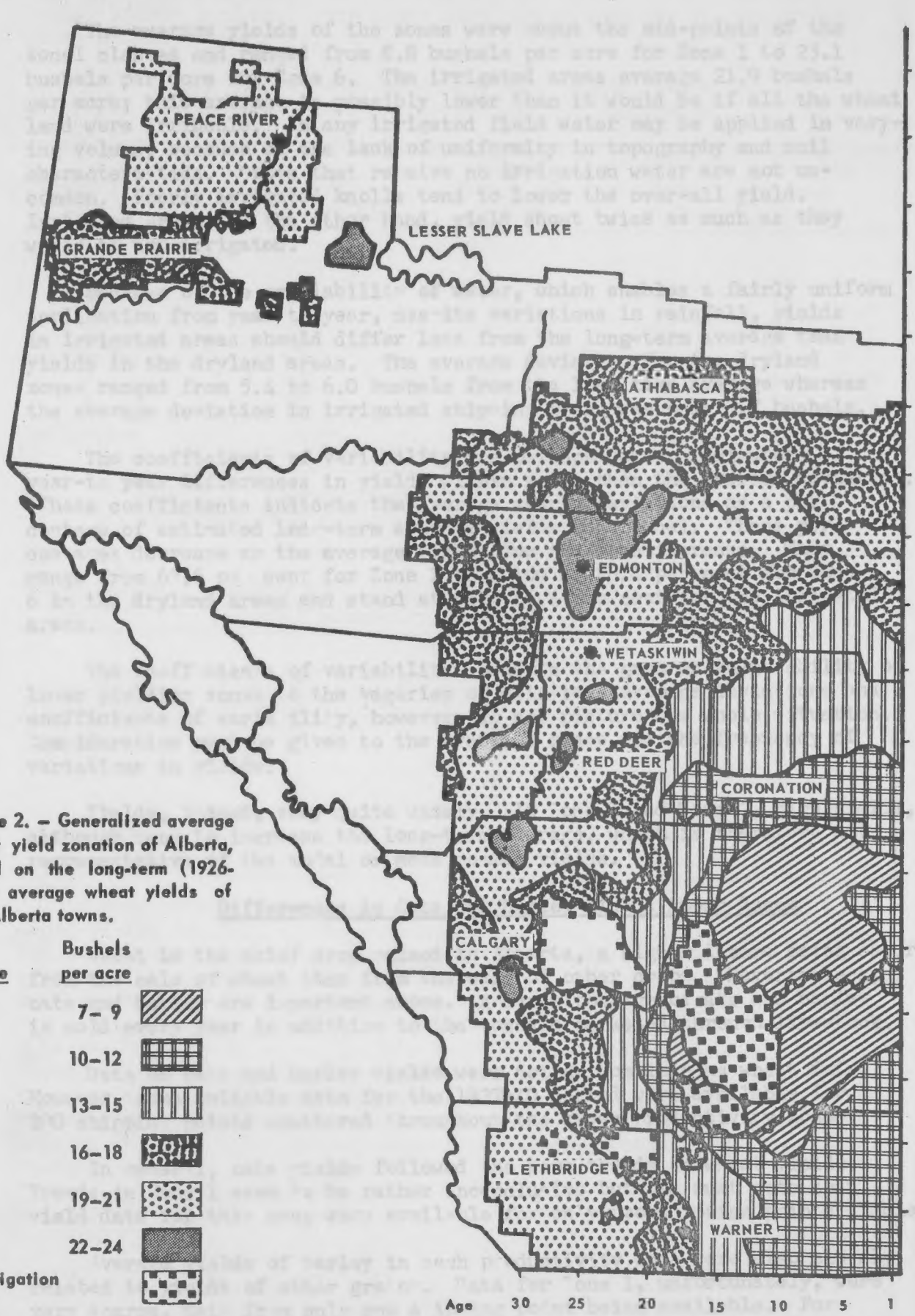

Figure 2. – Generalized average wheat yield zonation of Alberta, based on the long-term (1926-1950) average wheat yields of 404 Alberta towns.

Zone	Bushels per acre
1	7– 9
2	10–12
3	13–15
4	16–18
5	19–21
6	22–24
Irrigation	

The average yields of the zones were about the mid-points of the zonal classes and ranged from 8.8 bushels per acre for Zone 1 to 23.1 bushels per acre for Zone 6. The irrigated areas average 21.9 bushels per acre; this average is possibly lower than it would be if all the wheat land were irrigable. In any irrigated field water may be applied in varying volume, because of the lack of uniformity in topography and soil characteristics. Spots that receive no irrigation water are not uncommon. Poorly irrigated knolls tend to lower the over-all yield. Irrigated areas, on the other hand, yield about twice as much as they would if not irrigated.

Because of the availability of water, which enables a fairly uniform application from year to year, despite variations in rainfall, yields in irrigated areas should differ less from the long-term average than yields in the dryland areas. The average deviation for the dryland zones ranged from 5.4 to 6.0 bushels from the long time average whereas the average deviation in irrigated shipping areas was only 3.7 bushels.

The coefficients of variability are perhaps better indicators of year-to year differences in yields within zones than the average deviation. (These coefficients indicate the average yearly deviations as a per centage of estimated long-term average yields in a zone). These percentages decrease as the average yields for the zone increase. They range from 63.6 per cent for Zone 1 to a low of 23.4 per cent for Zone 6 in the dryland areas and stand at only 16.4 per cent for the irrigated areas.

The coefficients of variability indicate the greater vulnerability of lower yielding zones to the vagaries of climate. Average deviations and coefficients of variability, however, do not picture the whole situation. Consideration must be given to the over-all range and the frequency of variations in yields.

Yields, indeed, vary quite widely. In Zone 1 and Zone 2, high yields, although tend to increase the long-term average, which is therefore not representative of the modal or most common yields.

Differences in Oats and Barley Yields Among Zones

Wheat is the chief crop raised in Alberta, a higher income being secured from the sale of wheat than from the sale of other crops. Nevertheless, oats and barley are important crops. A large tonnage of oats and barley is sold every year in addition to the tonnage marketed through livestock.

Data on oats and barley yields were not as complete as wheat data. However, some reliable data for the 1927-40 period were available for 200 shipping points scattered throughout the seven productivity zones.

In general, oats yields followed the same trends as wheat yields. Trends in Zone 1 seem to be rather inconclusive but one must note that yield data for this zone were available for only two shipping points (Table 3).

Average yields of barley in each productivity zone were also closely related to yields of other grains. Data for Zone 1, unfortunately, were very scarce, data from only one shipping point being available. For Zone 2, data were available for only three shipping points. During the

1927-40 period, average wheat yields for the three points reporting barley yields in Zone 2 were lower than yields from the one reporting point in Zone 1 (Table 4).

Table 3.- Average wheat and oats yields, based on estimates from shipping points, 1927-40 period.

Productivity zone	Number of shipping points	Range in average wheat yields	Average wheat yields	Average oats yields
		- bushels -		
1	2	10.8	29.9	7 - 9.9
2	13	11.5	24.8	10 - 12.9
3	40	14.3	29.0	13 - 15.9
4	46	16.9	32.7	16 - 18.9
5	64	19.9	37.0	19 - 21.9
6	28	22.9	41.4	22 - 24.9
Irrigation	7	21.4	41.9	18.5 - 26.5

Table 4.- Average wheat and barley yields, based on estimates from shipping points, 1927-40 period.

Productivity zone	Number of shipping points	Range in average wheat yields	Average wheat yields	Average barley yields
		- bushels-		
1	1	11.9	17.1	7 - 9.9
2	3	11.2	18.2	10 - 12.9
3	21	15.7	20.6	13 - 15.9
4	34	17.0	23.9	16 - 18.9
5	54	20.0	25.8	19 - 21.9
6	27	22.8	28.5	22 - 24.9
Irrigation	7	21.4	33.3	18.5 - 26.5

A more satisfactory method of comparing oats and barley yields with wheat yields consists in the calculation of oats - wheat and barley - wheat ratios for each zone. For example, the oats-wheat ratio decreases as the productivity of the zone increases (Table 5). This would suggest that more oats should be grown in the lower than in the higher productivity zones.

The barley - wheat ratio is not as high as the oats - wheat ratio. However, the same reasons for not growing more barley in the lower yielding than in the higher yielding wheat zones are about the same as the reasons for not growing more oats. Both oats and barley are generally sown on stubbled land whereas wheat is more frequently sown on summer-fallowed land.

Table 5.- Relations ip between short term (1927-40) average yields of oats to wheat and barley to wheat based on estimates from the same shipping points.

Productivity zone	Range in average wheat yields	Ratios (Basis 1927-1940)	
		Oats - wheat	Barley - wheat
	- bushels -		
1	7 - 9.9	2.77:1	1.49:1
2	10 - 12.9	2.16:1	1.62:1
3	13 - 15.9	2.03:1	1.31:1
4	16 - 18.9	1.93:1	1.41:1
5	19 - 21.9	1.86:1	1.29:1
6	22 - 24.9	1.81:1	1.25:1
Irrigation	18.5 - 26.5	1.96:1	1.56:1

Wheat Yield Characteristics of the Soil Zones

The productivity zones, as mapped in Figure 2, may be compared with the zonation of Alberta soils depicted on the map of "Soil Zones of Alberta", prepared by experts doing soil survey work and reproduced in Figure 3. The soil zoning in Figure 3 is based primarily on the physical characteristics of the soil. Because of the great influence of climate on soil characteristics, there is a striking similarity between the two maps. Shipping points of the province were grouped according to soil zones and information was secured on the yield characteristics of these zones (Table 6). 1/ The soil zone with the lowest yields is the Brown Zone where long-term wheat yields ave age 11.1 bushels per acre compared with 15.4 in the Dark Brown Zone, 17.6 in the Thin Black Zone, 20.3 in the Black Zone, 19.8in the Degraded Black Zone and 20.2 in the Gray Wooded Soil Zone.

One weakness inherent in the data must be recognized. The yield characteristics of a particular shipping point are influenced by production on all types of soils within an individual shipping area. Some of these soils may be atypical zonally. This is of particular significance for the shipping points of the Grey Wooded Soil Zone where an upward bias in yield is likely introduced by the yields on Black and Degraded Black soils within the shipping areas.

Special attention is directed to the area in the northwestern portion of the province which is usually called the Peace River area. The early agricultural settlement of this district was on the more open and productive parkland soils. Figures on average long-term yields

1/ See the several soil survey reports of the University of Alberta, the Alberta Research Council and the Canada Department of Agriculture for the location of the soil zones of Alberta.

from this area are generally based on yields from the parkland soils near the shipping points. However, as more settlement takes place the average yields will be affected more and more by yields from Gray Wooded soils.

Table 6.- Long term average (1925-1950) wheat yields and deviations from shipping point averages by soil zones.

Soil zone	Number of shipping points	Estimated long-term average yield	Average deviation from shipping points long-term averages	Coefficient of variability
		- bushels per acre -		-per cent -
Brown	67	11.1	5.7	53.1
Dark Brown	76	15.4	6.3	41.8
Thin Black	61	17.6	5.8	33.6
Black	117	20.3	5.4	26.8
Degraded Black	46	19.8	5.2	26.5
Gray Wooded	15	20.2	4.9	24.3
Irrigated areas	12	21.9	3.7	16.4

For the few shipping points located on Gray Wooded soils, long-term average yields would also be affected by yields on soils other than Gray Wooded within the shipping areas. A bias is thus introduced into the data and one is justified to believe that the average long-term yields, in the area, will tend to decrease as more and more land of the Gray Wooded type is developed through future settlement.

Although there is a wide difference of 9.2 bushels per acre between the Brown Zone and the Black Zone, there is a fairly comparable average deviation of yields for each zone. The average of the deviations from the shipping point averages varied on the average from 4.9 bushels per acre for the Gray Wooded Soil Zone to 6.3 bushels per acre for the Dark Brown Soil Zone, with an average deviation of 5.5 bushels per acre for all the soil zones.

The coefficients of variability ranged from 53.1 per cent for the low-yielding Brown Soil Zone, to 24.3 per cent for the Gray Wooded Soil Zone. The coefficients are nearly alike for the Black, Degraded Black and Gray Wooded soil zones with values of 26.8, 26.5 and 24.3 per cent respectively.

An analysis of the yield data for the 404 shipping points discloses a wider range of long-term average wheat yields, per acre, among the shipping areas within the soil zones than within the productivity zones (Table 7).

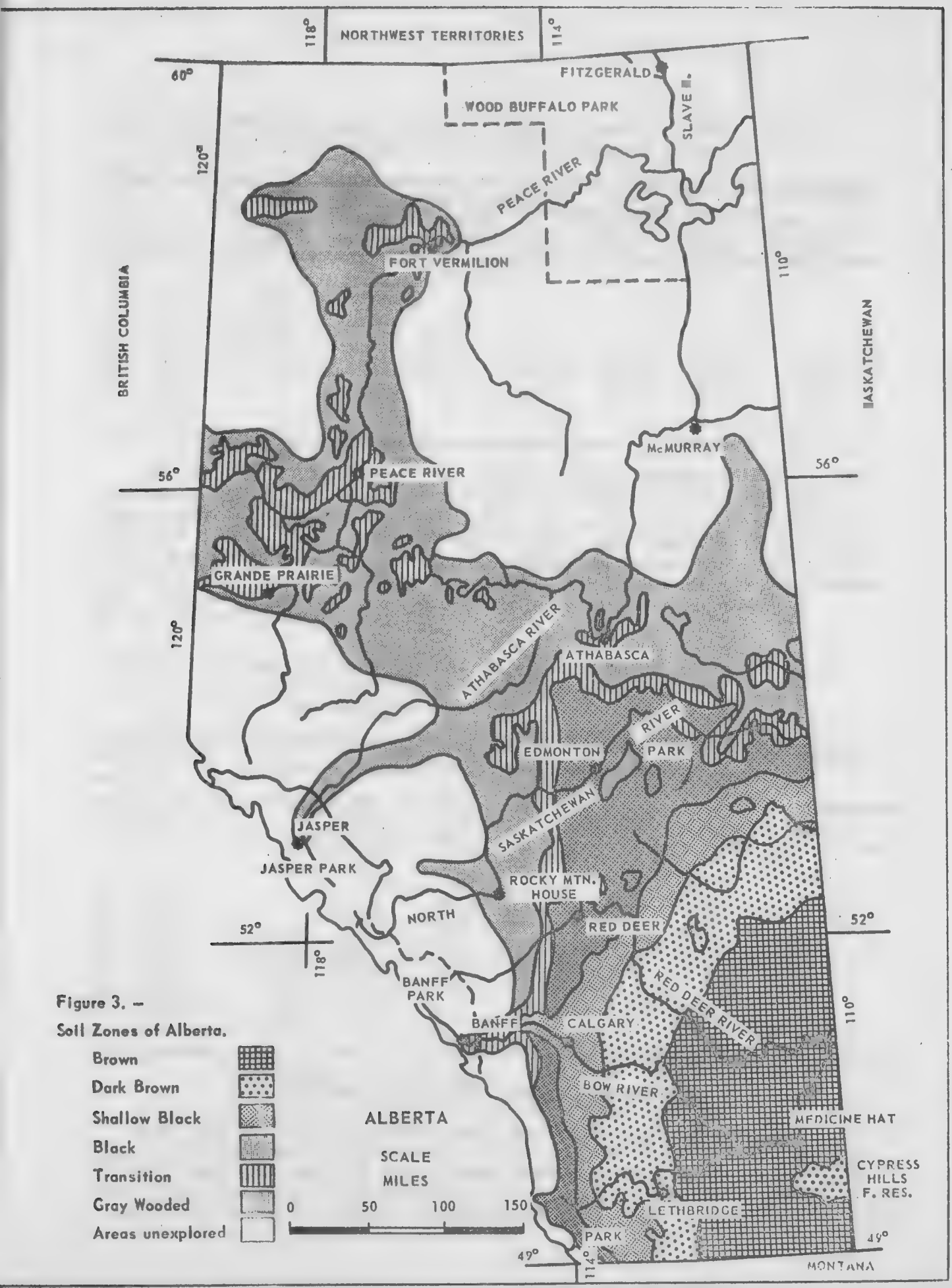

Figure 3. –
Soil Zones of Alberta.

Table 7.- Percentage distribution of shipping points in relation to long-term average wheat yields (1925-50), by soil zones.

Range in bushels	Soil zones						
	Brown	Dark Brown	Shallow; Black	Black	Degraded Black	Gray Wooded	Irrigated areas
	- per cent -						
6 - 9.9	32.8						
10 - 13.9	53.7	35.5	3.3				
14 - 17.9	13.4	44.7	55.7	16.2	21.7	13.3	
18 - 21.9		18.4	37.7	59.8	65.2	66.7	58.3
22 - 25.9		1.3	3.3	23.1	13.0	20.0	33.3
26 - 30.9				0.9			8.3

As the long-term average wheat yields varied considerably within the soil zones and as the average deviations are fairly constant for all average yields it is not surprising that the coefficients of variability vary over a wide range within the soil zones. The coefficients of variability for the shipping points located within the Brown Soil Zone were in the range of 30 to 80 per cent whereas the coefficients in the Gray Wooded soil zones were limited to a comparatively narrow range of from ten to 30 per cent (Table 8).

Table 8.- Percentage distrtibution of shipping points and coefficients of variability of long-term average wheat yields (1925-1950), according to soil zones.

Range in per cent of coefficient of variability	Soil zones						
	Brown	Dark Brown	Thin Black	Black	Degraded Black	Gray Wooded	Irrigated areas
	- per cent -						
10 - 19.9			4.9	8.5	8.7	6.7	75.0
20 - 29.9		7.9	27.9	66.7	73.9	93.3	25.0
30 - 39.9	20.9	32.9	47.5	23.1	17.4		
40 - 49.9	14.9	43.4	19.7	1.7			
50 - 59.9	32.8	13.2					
60 - 69.9	25.4	2.6					
70 - 79.9	6.0						

Productivity in Different Census Divisions

Much of the crop information published by federal and provincial and other agencies is published separately for each of the 17 Census divisions. For crop reporting purposes these Census divisions are sometimes referred to as "crop districts". Their boundaries are not related to differences in productivity among the various agricultural land areas of Alberta. Therefore,

the productivity characteristics described in this report should be useful for reference purposes and comparisons between census divisions. The Census divisions referred to in this report are the same as those described in the 1951 Census of Agriculture.

When data on crop yields are sorted by Census divisions no shipping points can be recorded for the Census divisions 12 and 17. Crop acreages are rather small in these two divisions. The results of this sorting are given in Table 9. Census division 3 was divided into two parts, which makes it possible to compare wheat yields on irrigated land with yields on dry land in the driest area of the province. Shipping points with estimated yields indicating that no advantage had been derived from irrigation were subsorted into Census division 3A and those with yields reflecting the advantages of irrigation were subsorted into Census division 3B.

Table 9.- Estimated long-term (1925-1950) average wheat yields, 17 Census divisions, Alberta.

Census division	Average wheat yield	Average deviation	Coefficient of variability
	- bushels per acre -		- per cent -
1	13.0	5.4	41.5
2	19.3	5.0	25.9
3A	9.7	5.7	58.8
3B	19.9	3.5	17.6
4	17.0	5.7	33.5
5	11.6	6.6	56.9
6	18.8	6.1	32.4
7	14.4	5.9	41.0
8	18.5	5.6	30.3
9	21.6	4.3	19.9
10	18.5	5.6	30.3
11	21.3	5.5	25.8
13	19.2	5.5	28.6
14	20.4	5.2	25.5
15	20.6	5.3	25.7
16	19.4	5.1	26.3

The highest long-term average wheat yields were obtained in Census division 9 and the lowest yield in Census division 3A; average yields ranged from 21.6 to 9.7 bushels per acre. The average deviation from the long-term average was fairly constant at about 5.5 bushels, excepting the low average deviation of 3.5 bushels in the irrigated Census division 3B and the low average deviation of 4.3 bushels in Censusdivision 9.

Since there was a fairly uniform average deviation and quite a wide range in average yields, the coefficient of variability also shows a wide range among Census divisions. The lowest coefficient of

variability was 17.6 per cent for Census division 3B and the highest was 58.8 per cent for Census division 3A. Considering its lack of irrigation, Census division 9 had a surprisingly low coefficient of deviation of only 19.9 per cent, the lowest of all the Census divisions except irrigated Census 3B.

Among shipping points, wide differences from the average for all census divisions may be expected because the boundaries were drawn without consideration being given to productivity differences. Differences among shipping point areas, within the census divisions, are shown through the frequency distribution of average yields and the coefficients of variability for the shipping points. (Tables 10 and 11)

The fairly uniform yields in Census divisions 3B and 9, as indicated by figures on yields, are further substantiated by the distribution of the averages for the shipping points. Both Census divisions have a low coefficient of variability and the stations reporting data have a narrow range of estimated averages.

Available information on estimated yields of oats and barley, per acre, is more complete for census divisions than for the soil zones. It was not possible to subdivide Census division 3 as was done for wheat yields but nevertheless, one may expect to find the same type of difference between yields, on irrigated and on dry land, as was disclosed for wheat yields.

The highest average yield per acre, for oats, (37.6 bushels) over the period from 1925 to 1950 was obtained in Census division 16 and the lowest yield (21.5) bushels) was in Censusdivision 5. The relationship between oats and wheat yields is expressed by a ratio which is arrived at by dividing the long-term average oats yield by the long-term average wheat yield. This ratio was highest at 1.98:1 in Census division 3 and lowest at 1.59:1 in Census division 9 (Table 12).

The average oats yields per acre and the ratio of oats to wheat yields showed less variation among census divisions over the longer term (1925-50) than during the shorter term (1927-40) for which data were available for the soil zones.

The highest estimated long-term average yield per acre, for barley, was recorded in Census divisions 2 and 3 where each had an average of 27.4 bushels per acre. Part of the farm land in these two divisions is irrigated. The lowest average yield, for barley, was 16.8 bushels per acre in Census division 5. The ratio of barley to wheat yields was highest in Census division 3 at 1.83:1 and lowest in Census division 13 at 1.16:1 (Table 13). As for oats yield data the longer-time period was associated with a smaller variation among Census divisions, in average yields per acre, for barley, as well as in the ratios of barley to wheat yields.

Table 10.- Percentage distribution of shipping points and long-term average wheat yields (1925-50), 17 Census divisions, Alberta.

Range of average wheat yield in bushels	Census divisions															
	1	2	3A	3B	4	5	6	7	8	9	10	11	13	14	15	16
	- per cent -															
6 - 9.9	11.1		50.0			40.0										
10 - 13.9	51.8		50.0		18.2	33.3		50.0	10.3		2.0					
14 - 17.9	37.0	23.1			54.5	13.3	42.5	47.7	36.2	9.1	40.0	3.3	10.0	8.7		
18 - 21.9		69.2		44.4	22.7	13.3	47.5	2.3	41.4	54.5	51.1	53.3	80.0	65.2	14.3	21.7
22 - 25.9		7.7		44.4	4.5		10.0		12.1	27.3	6.7	40.0	10.0	26.1	57.1	78.3
26 - 30.9				11.1						9.1		3.3			28.6	

Table 11.- Percentage distribution of shipping points and coefficient of variability of shipping point average yields, 17 Census divisions, Alberta.

Range of coefficient of deviation in per cent	Census divisions															
	1	2	3A	3B	4	5	6	7	8	9	10	11	13	14	15	16
	- per cent -															
10 - 19.9				100.0	4.5		5.0		10.3	45.5		3.3		817	14.3	
20 - 29.9		76.9			31.8		27.5	2.3	37.9	54.5	44.4	90.0	70.0	78.3	71.4	95.7
30 - 39.9	48.1	23.1	8.3		36.4	6.7	45.0	27.3	29.3		55.6	6.7	30.0	13.0	14.3	4.3
40 - 49.9	18.5		25.0		13.6	13.3	22.5	47.7	20.7							
50 - 59.9	33.3		25.0		13.6	26.7		18.2	1.7							
60 - 69.9			41.7			40.0		4.5								
70 - 79.9						13.3										

Table 12.- Relationship between average oats yields and wheat yields, by Census Divisions, for long-term (1925-50) and short-term periods (1927-40)

Census division	Long-term period (1925-50)			Short-term period (1927-40)
	Average wheat yield	Average oats yield	Ratio of oats to wheat yields	Ratio of oats to wheat yields
	- bushels per acre -			
1	13.0	24.2	1.86:1	1.96:1
2	19.3	32.5	1.68:1	1.55:1
3	15.0	29.7	1.98:1	2.09:1
4	17.0	32.9	1.94:1	1.72:1
5	11.6	21.5	1.85:1	1.72:1
6	18.8	33.4	1.78:1	1.80:1
7	14.4	25.1	1.74:1	1.48:1
8	18.5	33.1	1.79:1	1.68:1
9	21.6	34.3	1.59:1	1.61:1
10	18.5	30.9	1.67:1	1.68:1
11	21.3	36.0	1.69:1	1.61:1
12	19.2	34.2	1.78:1	1.84:1
13	19.2	31.6	1.64:1	1.67:1
14	20.4	34.2	1.68:1	1.61:1
15	20.6	36.8	1.79:1	1.54:1
16	19.4	37.6	1.94:1	1.79:1

Table 13.- Relationship between average barley yields and wheat yields by census divisions for long-term (1925-50) and short-term periods (1927-40).

Census division	Long-term period (1925-50)			Short term period (1927-40)
	Average wheat yield	Average barley yield	Ratio of barley to wheat yield	Ratio of barley to wheat yield
	- bushels per acre -			
1	13.0	19.6	1.15:1	1.37:1
2	19.3	27.4	1.42:1	1.33:1
3	15.0	27.4	1.83:1	2.02:1
4	17.0	24.6	1.45:1	1.24:1
5	11.6	16.8	1.45:1	1.39:1
6	18.8	24.2	1.29:1	1.26:1
7	14.4	18.0	1.25:1	1.01:1
8	18.5	25.0	1.35:1	1.27:1
9	21.6	25.5	1.18:1	1.20:1
10	18.5	22.3	1.21:1	1.23:1
11	21.3	25.4	1.19:1	1.16:1
12	19.2	23.3	1.21:1	1.19:1
13	19.2	22.2	1.16:1	1.11:1
14	20.4	24.2	1.19:1	1.15:1
15	20.6	26.0	1.26:1	1.10:1
16	19.4	24.2	1.25:1	1.13:1

APPENDIX I

Long-term (1925-1950) average wheat yields and yield characteristics, 404 shipping areas of Alberta and, (where available)short-term (1927-1940) average yields of oats and barley.

Shipping points	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
				- bushels per acre -		
Acadia Valley	5	2	14.3	6.6		
Acme	6	4	16.7	6.1	30.7	23.0
Airdrie	6	5	21.1	6.2	39.7	24.4
Albright	16		19.h	7.0		
Alcomdale	14	5	20.6	5.0	39.8	24.8
Aldersyde	4	4	16.3	6.3	37.7	25.1
Alhambra	9	5	21.8	4.8	37.8	25.7
Alix	8	5	19.8	5.2	28.3	22.1
Alliance	7	3	14.4	6.1	27.4	17.6
Amisk	7	3	14.9	6.0	32.9	
Andrew	10	5	20.2	5.4		
Ankerton	8	3	15.5	6.8	24.3	18.6
Ardley	8	5	20.0	4.6		
Ardrossan	11	6	22.0	4.7	41.8	28.1
Armada	4	2	12.0	6.5		
Armena	8	5	19.6	5.3	39.3	23.7
Armistice	13	4	18.7	6.1		
Arneson	5	2	11.1	6.3		
Arrowwood	4	4	17.1	6.9		
Arvilla	14	4	16.3	4.9		
Ashmont	13	5	19.3	6.4		
Atlee	3A	1	8.5	5.3	28.5	
Balzac	6	5	19.1	7.3		
Bardo	11	5	19.8	6.6		
Barnwell	2	4	16.2	5.5	42.6	33.6
Barons	4	4	16.6	4.6	43.0	33.6
Barrhead	14	5	21.5	4.1	34.8	25.6
Bashaw	8	5	21.5	5.7	35.5	26.7
Bassano	3A	2	12.3	8.3		
Bawlf	8	4	17.1	5.1	31.4	30.5
Beauvallon	10	5	19.6	6.0	35.0	25.3
Beaver Hill	10	6	24.0	6.4		
Beaverlodge	16	4	17.6	5.0		
Beiseker	6	4	16.1	5.9	31.9	21.1
Bellis	13	4	18.5	5.0	34.3	25.9
Belloy	16	5	21.6	6.2		
Bentley	9	6	25.9	5.7	35.1	28.3
Benton	5	2	10.3	6.0		
Berwyn	16	5	20.6	5.3	44.5	

Long-term (1925-1950) average wheat yields and yield characteristics, 404 shipping areas of Alberta and, (where available) short term (1927-1940) average yields of oats and barley
(continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
			- bushels per acre -			
Big Valley	8	3	14.1	5.8	32.8	
Bindloss	3A	2	10.4	5.9		
Bircham	6	4	16.7	6.5	33.7	
Blackfalds	8	5	20.8	3.9		
Blackfoot	10	4	17.8	5.1		
Blackie	4	4	15.8	5.1	35.0	
Bluesky	16	5	17.8	4.5		
Bluffton	9	4	17.7	3.8		
Bon Accord	11	6	22.0	5.3	38.1	28.1
Bonar	5	2	11.4	7.3		
Borradaile	10	3	15.8	5.6	33.6	21.0
Botha	8	3	14.7	7.3		
Bowden	9	6	23.4	3.9	37.1	28.7
Bow Island	1	1	9.8	5.0		
Bradshaw	2	5	21.1	5.1	33.8	
Brant	4	4	17.8	5.6	35.2	
Bremner	11	6	23.6	6.4	44.8	31.2
Brooks	3B	Irr.	22.4	2.6	44.9	34.4
Brownvale	16	5	20.9	5.2	47.4	29.4
Broxburn	2	Irr.	18.6	3.8		
Bruce	7	4	15.9	6.1	29.1	22.2
Bruderheim	10	6	23.8	5.5	43.8	32.5
Buffalo	3A	1	8.5	5.5		
Bulwark	7	3	13.1	6.3	21.4	
Bouvant	6	4	17.1	6.9		
Busby	14	5	20.5	5.9	45.1	30.9
Butze	7	3	13.5	5.5		
Byemoor	8	2	12.7	5.8	26.8	
Cadogan	7	2	12.3	5.5	26.2	
Caley	4	5	20.2	5.0		
Calgary	6	5	20.1	3.9		
Camrose	8	4	17.4	4.9	34.0	24.3
Carbon	6	5	19.4	5.9	33.7	
Carbondale	11	6	27.7	7.3		
Carmangay	4	3	14.4	5.7	25.8	
Carolside	5	1	7.3	5.3		
Carstairs	6	5	19.6	5.0	37.8	26.0
Castor	7	2	12.3	5.2	24.6	
Cereal	5	1	8.6	5.4		
Cessford	5	1	7.5	5.7		
Champion	4	3	15.8	6.0	31.2	21.8

Long-Term (1925-1950) Average Wheat Yields and Yield Characteristics, 404 Shipping Areas of Alberta and, (where available) Short Term (1927-1940) Average Yields of Oats and Barley (continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
			- bushels per acre -			
Chauvin	7	3	15.2	6.0	26.5	
Chigwell	8	5	20.2	5.3		25.8
Chin	2	3	15.7	5.2		
Chinook	5	1	8.1	5.2		
Chipman	10	4	18.0	6.2	36.1	23.8
Clairmont	16	4	19.6	4.9		
Clandonald	10	4	18.5	3.9	31.6	22.7
Claysmore	10	4	18.5	5.3	41.9	26.7
Clive	8	5	19.6	5.9	37.3	25.6
Clyde	14	4	17.8	5.3	33.2	23.8
Coaldale	2	Irr.	23.5	4.9		
Cochrane	6	4	16.3	4.6		
Compeer	7	2	10.1	5.9		
Condor	9	6	22.2	4.8		
Conrad	1	3	15.5	5.3		
Conrich	6	5	19.5	5.2		
Consort	7	2	10.4	6.1		
Coronado	14	4	18.5	4.6		
Coronation	7	2	11.9	6.5	24.1	
Countess	3B	Irr.	20.7	4.0	42.5	35.8
Coutts	1	3	15.2	5.4		
Craddock	2	4	18.2	5.1		
Craigmyle	5	3	13.7	6.8	24.3	
Crossfield	6	4	18.9	5.8	35.1	23.6
Cygnet	9	5	21.5	4.7		
Czar	7	3	13.1	6.2	27.1	
Dalemead	6	5	19.5	6.2	36.2	21.7
Dalroy	6	4	17.3	7.1		
Dapp	14	6	22.0	5.6	46.8	30.5
Daysland	8	4	17.7	6.5	31.3	21.2
Delacour	6	4	17.9	7.3	31.6	
Delburne	8	5	20.7	6.4	33.8	24.6
Delia	5	3	13.5	7.2		
Demay	8	4	17.5	5.6		
Derwent	10	5	20.4	6.2		
Deville	11	5	19.4	4.8		
Dewberry	10	5	19.7	4.8	44.5	24.6
De Winton	4	6	22.7	5.2		
Didsbury	6	6	18.6	5.2	31.1	25.1
Demsdale	16	4	16.2	4.9	43.8	30.0

Long-term (1925-1950) average wheat yields and yield characteristics, 404 shipping areas of Alberta and, (where available) short term (1927-1940) average yields of oats and barley.
(continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
			- bushels per acre -			
Dinant	8	5	19.5	6.7		
Donalda	8	4	16.9	5.6	32.1	22.2
Dorenlee	8	5	20.4	5.5	31.9	25.8
Dowling	5	2	10.2	5.5		
Duagh	11	6	22.6	6.1	45.2	29.8
Duchess	3B	Irr.	24.9	4.2	46.4	34.6
Duhamel	8	5	21.5	5.6	43.1	25.4
Dunmore	1	2	12.6	5.5		
Eaglesham	16	5	20.4	4.7		
Eckville	9	5	21.5	4.6	35.3	28.4
Edgerton	7	3	15.3	5.5	29.6	
Edouardville	13	5	19.8	5.8		
Edvand	14	4	18.0	5.2	29.2	24.2
Egremont	14	5	21.7	5.8		
Ellerslie	11	6	22.3	5.5		
Elnora	8	4.	19.4	7.1		
Empress	3A	2	10.4	4.8	28.0	
Enchant	3A	2	10.2	3.9		
Endiang	8	3	13.0	5.5		
Enilda	15	6	22.5	6.5		
Ensign	4	4	16.9	5.2		
Entice	6	4	17.4	6.9		
Equity	6	5	20.7	6.5		
Erskine	8	4	17.4	5.7	30.2	23.5
Etzikom	1	2	12.2	6.3		
Excel	5	2	10.0	6.0		
Fabyan	7	3	15.2	6.5	27.6	
Fairview	16	5	18.0	4.2	38.5	30.8
Falher	15	5	17.6	4.7	37.6	
Federal	7	2	11.0	5.2		
Fedorah	14	5	19.8	6.2	33.6	
Fenn	8	4	17.0	7.2		
Ferintosh	8	5	21.0	5.9	36.4	26.1
Fincastle	1	2	12.5	4.5	29.8	24.7
Fleet	7	2	11.4	5.7	20.5	
Foremost	1	2	11.6	4.4	28.1	
Forestburg	7	3	15.3	6.3	26.1	19.1

Long-term (1925-1950) average wheat yields and yield characteristics 404 shipping areas of Alberta and, (where available) short term (1927-1940) average yields of oats and barley (continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
			- bushels per acre -			
Forshee	9	6	23.0	4.4	35.2	26.2
Fort Saskatchewan	11	6	22.5	6.3	45.8	28.4
Gadsby	8	2	12.3	6.0	22.4	
Gage	16	5	18.6	4.5		
Galahad	7	3	15.1	6.6	26.8	21.1
Gartley	5	4	18.2	9.8		
Gatine	6	5	19.2	6.6		
Gibbons	11	6	22.3	5.5	40.6	26.1
Girouxville	15	5	20.2	5.9	37.2	
Glendon	13	4	18.4	5.2		
Grainger	6	3	15.8	6.8		
Grande Prairie	16	4	17.7	5.3	46.1	28.8
Grantham	3B	Irr.	20.6	3.5	39.1	30.9
Grassy Lake	1	2	11.2	4.6		
Greenshields	7	3	15.5	6.1	36.3	
Grimshaw	16	5	20.3	4.8	37.8	
Gunn	11	5	20.0	5.2	37.5	
Gwynne	8	5	21.8	5.4	40.0	27.9
Hackett	8	2	12.4	5.6		
Haight	10	4	18.0	6.0	33.9	25.3
Hairy Hill	10	5	19.4	5.2	38.0	25.9
Halkirk	8	2	12.2	6.3	22.4	
Hanna	5	2	10.2	6.4		
Hardisty	7	3	13.9	6.0	27.1	20.8
Hay Lake	11	5	20.6	4.0	40.4	29.2
Haynes	8	5	19.9	4.7	36.8	24.4
Hayter	7	3	13.0	6.4	27.4	
Hazeldine	10	5	19.6	6.9		
Heath	7	3	15.9	7.4	30.4	
Heisler	8	3	15.4	6.7	26.7	20.6
Hemaruka	5	1	9.0	6.0		
Hesketh	6	4	17.8	7.3		
Hespero	9	5	20.4	3.4		

Long-term (1925-1950) average wheat yields and yield characteristics, 404 shipping areas of Alberta and, (where available) short term (1927-1940) average yields of oats and barley (continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
			- bushels per acre -			
High Prairie	15	6	24.5	5.5	50.6	31.2
High Ridge	14	4	18.5	4.3		
Hilda	3A	1	9.9	5.8	21.3	17.7
Hilliard	10	5	20.5	4.9	40.4	29.2
Hines Creek	16	5	19.9	4.2		
Hobbema	8	6	23.3	4.3	42.4	26.7
Holden	10	4	17.5	6.2	31.0	25.9
Huallen	16	4	18.7	4.4		
Hughendon	7	3	13.4	5.6	30.9	
Huxley	6	4	16.4	6.5	28.8	
Iddlesliegh	3A	1	7.8	5.1		
Indus	6	5	20.5	5.5	42.8	26.2
Innisfail	8	5	20.8	5.1	38.6	27.4
Innisfree	10	4	16.7	5.3	30.6	22.8
Inverlake	6	Irr.	19.4	5.5		
Irma	7	3	15.9	5.5	31.5	
Irvine	1	2	11.5	5.7		
Islay	10	3	15.5	5.8	32.3	19.1
Janet	6	4	18.6	5.2		
Jarrow	7	4	16.1	6.0	31.2	
Jenner	3A	1	8.0	5.3		
Joffre	8	6	23.2	7.1		
Judah	15	5	18.1	5.8		
Judson	1	3	15.8	7.7		
Kathryn	6	Irr.	17.3	6.2	30.4	20.9
K avanagh	11	5	21.5	5.4	34.6	27.9
Kelsey	8	4	17.5	6 0	25.8	18.0
Keoma	6	Irr.	16.9	6.0		
Killam	7	3	15.5	5.2	27.4	18.9
Kingman	11	5	20.2	5.9	41.0	29.6
Kinsella	7	4	16.1	6.3	32.1	
Kirkcaldy	4	4	16.8	5.9	28.2	
Kirkpatrick	6	5	22.2	6.8		
Kiron	7	4	18.0	5.3		
Kirriemuir	7	2	10.2	6.5		
Kitscoty	10	4	17.0	5.6	31.8	24.3

Long-term (1925-1950) average wheat yields and yield characteristics, 404 shipping areas of Alberta and (where available) short term (1927-1940) average yields of oats and barley
(continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield.
			- bushels per acre -			
Lacombe	8	6	22.2	4.4	35.4	27.1
Lamont	10	5	19.3	5.7		
Lanfine	5	2	10.5	6.0		
Langdon	6	Irr.	18.5	6.1	34.4	28.9
Lavoy	10	4	17.7	5.1	33.8	22.8
Leahurst	8	4	18.1	6.9		
Leduc	11	6	22.3	4.7	37.2	27.1
Legal	14	6	22.1	5.6	35.9	29.2
Legend	1	3	13.6	5.8		
Lethbridge	2	4	18.8	5.2		
Lindbrook	11	5	20.4	6.0		
Lomond	4	2	11.2	5.4		
Looma	11	5	19.1	5.3		
Loughheed	7	3	14.8	5.4	30.9	21.0
Lousana	8	4	18.5	6.8	34.9	
Loyalist	7	2	10.3	5.4		
McNab	1	4	17.7	5.6		
Magrath	2	Irr.	20.2	4.3	42.5	32.0
Manola	14	5	20.6	5.1	36.3	25.6
Manville	10	3	15.2	4.9	30.8	21.2
Manyberries	1	2	10.6	5.3		
Marwayne	10	4	18.1	5.2	35.7	25.4
Mearns	11	5	21.3	5.5		
Medicine Hat	1	2	11.5	4.4		
Meeting Creek	8	5	19.7	5.4	29.5	23.4
Menaik	8	6	22.9	4.5	41.6	26.9
Metiskow	7	3	13.3	6.0	27.2	
Michichi	5	3	15.9	7.6		
Midnapore	6	6	22.6	4.4		
Milk River	1	3	14.7	5.1	28.8	21.8
Millet	11	5	19.6	5.2	32.4	26.2
Milo	4	3	14.8	7.7		
Minburn	10	3	13.6	4.8	29.1	18.1
Mirror	8	5	19.6	5.0	29.1	18.1
Monitor	7	2	10.5	6.0		
Morinville	11	5	20.3	5.1	44.6	26.8
Morningside	8	5	21.2	5.2		
Morrin	5	5	19.3	8.2	34.4	
Mundare	10	5	19.8	6.3	33.7	25.2
Munson	5	5	21.3	8.4		

Long-term (1925-1950) average wheat yields and yield characteristics, 404 shipping areas of Alberta and, (where available) short term (1927-1940) average yields of oats and barley
(continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
			- bushels per acre -			
Musidora	10	5	19.4	6.0		
Myrnam	10	5	19.9	5.8	38.9	25.5
Nacmine	6	4	18.2	7.4		
Naco	5	1	8.5	6.0		
Nampa	15	5	20.8	4.9		
Nanton	4	5	20.5	5.1	32.5	
Navarre	8	5	21.2	4.0		
Nemiscam	1	2	11.9	6.2		
Netook	6	6	24.2	5.3		
Nevis	8	4	15.9	5.1		
New Bridgen	5	1	9.6	6.5		
New Dayton	1	4	16.6	6.4	24.8	26.4
New Norway	8	5	21.5	5.7	35.1	22.5
New Sarepta	11	5	20.1	5.7	41.7	23.7
Nisku	11	6	24.2	5.1	41.8	30.4
Norfolk	6	Irr	17.8	5.4	29.2	
Ohaton	8	4	15.5	5.7	31.9	22.7
Okotoks	4	5	21.2	4.0	40.5	26.8
Olds	6	6	22.3	4.6	41.4	27.8
Onoway	11	5	20.5	5.2		
Opal	14	5	19.2	4.4	32.5	23.4
Orion	1	2	10.4	5.3		
Owlseye	13	5	19.1	5.3		
Oyen	5	1	9.8	6.0		
Parkland	4	5	19.2	4.7	32.2	
Patricia	3B	Irr.	21.1	3.1		
Peace River	15	5	20.6	4.0	38.8	
Pemukan	7	2	11.2	7.3		
Penhold	8	5	21.6	4.5	40.0	28.4
Phillips	10	4	16.2	5.8		
Pibroch	14	6	23.0	6.2	41.2	27.1
Picardville	14	5	19.7	4.6	39.8	22.1
Pivot	3A	2	10.8	5.6		
Poe	10	4	17.7	6.1		
Ponoka	8	5	20.3	4.3	35.5	24.1

Long-term (1925-1950) average wheat yields and yield characteristics, 404 shipping areas of Alberta and, (where available) short term (1927-1940) average yields of oats and barley
(continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
			- bushels per acre -			
Prentiss	8	6	24.5	5.0	41.7	26.5
Prestville	16	5	20.0	5.1		
Provost	7	2	11.8	5.7	24.8	16.1
Pulteney	4	5	21.2	4.7		
Purple Springs	1	2	12.7	4.6		
Queenstown	4	3	13.2	7.9		
Radway	14	6	22.3	5.8	36.7	27.5
Rainier	3B	Irr.	21.3	2.8		
Raley	2	5	20.0	5.5		
Ranfurly	10	4	17.8	5.1	36.4	23.4
Raymond	2	5	19.2	5.5	34.7	28.2
Red Deer	8	6	22.3	5.1	40.0	27.5
Redwater	14	5	21.5	4.7	37.6	26.6
Red Willow	8	4	17.8	6.2		
Retlaw	3A	1	7.7	3.6		
Ribstone	7	3	14.6	6.2	29.0	
Richdale	5	1	9.9	6.6		
Rimbey	9	5	19.6	3.6	37.5	26.9
Roma	16	5	21.2	4.8	40.9	
Rosalind	8	3	15.5	6.3	28.2	21.2
Rose Lynn	5	1	8.6	5.9		
Rosemary	3B	Irr.	26.5	4.2	39.5	
Rosyth	7	3	15.4	6.2	28.0	
Roundhill	8	4	17.0	5.8	35.4	19.6
Rowley	5	5	19.1	7.4	34.2	
Royal Park	10	5	19.4	5.5	36.1	27.4
Rusylvia	10	4	18.2	5.5	33.7	22.1
Rycroft	16	5	21.0	5.6		
Ryley	10	4	16.2	5.5	30.1	20.6
Scapa	5	2	11.2	5.8		
Schuler	3A	2	10.5	5.2		
Scollard	8	3	13.8	5.5		
Scotford	11	6	22.1	5.1	38.8	26.9
Sedalia	5	1	9.9	7.0		

Long-term (1925-1950) average wheat yields and yield characteristics, 404 shipping areas of Alberta and, (where available) short term (1927-1940) average yields of oats and barley (continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
			- bushels per acre -			
Sedgewick	7	3	14.5	5.5	25.9	17.4
Seven Persons	1	2	11.8	6.6		
Sexsmith	16	4	18.9	5.6	44.6	
Sharples	6	5	20.7	7.7		
Shepard	6	5	20.3	5.3		
Shonts	10	4	16.4	7.6		
Shouldice	4	3	15.4	7.5		
Sibbald	5	2	10.9	6.8		
Skiff	1	3	14.4	5.0		
Slawa	10	4	17.4	5.9		
Smoky Lake	14	5	19.1	5.5	33.8	24.6
Spedden	13	5	22.1	5.8	45.8	28.2
Spirit River	16	5	19.9	5.2	40.6	30.8
Spring Coulee	2	5	21.9	5.3		
Spruce Grove	11	5	21.4	5.3	37.8	25.9
St. Michael	10	5	19.0	3.8		
St. Paul	13	5	18.2	6.2	38.8	27.3
Stanmore	5	1	9.3	6.5		
Staplehurst	10	4	16.3	5.1		
Star	10	6	23.6	5.0		
Stavely	4	4	18.0	4.0	30.6	
Stettler	8	4	16.3	6.2	28.3	18.4
Stirling	2	4	17.3	5.9	28.2	
Streamstown	10	4	17.9	5.8	36.4	21.1
Strome	7	4	16.0	6.4	29.8	22.6
Swalwell	6	3	14.7	7.2		
Sylvan Lake	9	5	21.2	3.8	30.8	29.3
Taber	1	3	13.4	4.7	31.0	28.2
Tees	8	5	19.7	4.5		
Therien	13	4	17.8	4.3		
Thorsby	11	4	18.2	4.4		
Three Hills	6	5	19.6	7.1	35.0	
Throne	7	2	11.5	6.6		
Tilley	3B	Irr.	23.7	3.3		
Tofield	11	5	19.3	5.3	40.4	23.8
Trochu	6	5	19.5	6.4	36.0	
Two Hills	10	4	18.3	5.8	31.8	23.5

Long-term (1925-1950) average wheat yields and yield characteristics, 404 shipping areas of Alberta and, (where available) short term (1927-1940) average yields of oats and barley (continued)

Shipping point	Census division	Wheat yield zone	Average wheat yield	Average deviation	Average oats yield	Average barley yield
			- bushels per acre -			
Vauxhall	3B	Irr.	19.4	3.6	43.6	31.8
Vegreville	10	4	17.5	6.5	33.9	22.3
Veldt	7	3	13.2	5.9	25.8	
Vermilion	10	3	15.6	5.8	31.4	22.9
Veteran	7	2	11.5	6.4		
Viking	7	3	14.7	5.5	29.0	19.6
Villeneuve	11	6	24.9	6.8	56.0	27.4
Vilna	13	5	20.2	4.8	35.5	25.4
Vimy	14	6	22.8	4.3	45.4	31.4
Volmer	11	6	22.3	6.8	52.2	31.1
Vulcan	4	4	17.2	5.6	27.9	
Wainwright	7	3	15.6	5.6	33.5	19.4
Walsh	1	2	11.9	6.6	20.0	13 8
Wanham	16	5	19.3	5.2		
Warburg	11	4	16.0	4.0		
Warden	8	4	16.5	6.8		
Warner	1	4	16.6	5.0	30.6	
Warspite	14	6	22.2	6.0	38.6	32.3
Waskateneau	14	5	21.9	6.8	42.1	23.6
Watts	5	2	11.8	6.4	24.1	
Wayne	6	3	15.5	7.4		
Welling	2	5	20.2	4.2		
Wembly	16	4	17.8	5.1	48.8	23.8
Westlock	14	5	20.6	4.8	35.6	
Wetaskiwin	8	5	21.8	4.2	40.1	25.1
Whitelaw	16	5	19.5	4.8		
Whitford	10	5	21.4	6.3		
Whitla	1	1	9.7	4.9		
Willingdon	10	5	19.6	5.4	40.0	26.5
Winnifred	1	1	9.1	4.9		
Wostock	10	5	19.9	4.8		
Wrentham	1	3	15.3	5.5	30.2	

APPENDIX II

Frequency distributions based on percentage deviations in bushels above and below the long-term shipping point average wheat yields, by productivity zones

Deviation from averages in bushels	Productivity zone							Weighted provincial average
	1	2	3	4	5	6	Irrigation	
	- per cent -							
Below 19	-	-	-	-	.07	-	-	.01
18	-	-	-	.04	.10	.20	-	.05
17	-	-	-	-	.20	-	.32	.07
16	-	--	-	.09	.40	.72	.32	.22
15	-	-	.07	.31	.40	.41	-	.17
14	-	-	.59	1.02	.94	.82	-	.48
13	-	.08	1.24	.93	1.14	1.23	-	.66
12	-	.08	1.82	2.03	1.57	1.54	.32	1.05
11	.19	.94	2.86	2.39	1.61	.82	.65	1.35
10	.19	2.81	3.06	2.39	1.81	2.66	-	1.85
9	2.25	3.98	3.64	3.45	2.18	2.46	.97	2.70
8	4.68	5.46	4.29	4.02	3.72	3.79	.32	3.75
7	6.55	5.00	4.49	3.62	3.75	3.68	3.25	4.33
6	9.18	6.87	4.55	4.73	3.72	2.97	4.22	5.18
5	8.61	5.62	4.49	4.15	4.69	4.50	5.52	5.37
4	9.18	5.39	5.08	3.84	3.99	4.91	7.47	5.69
3	9.55	4.61	5.14	4.42	4.45	4.40	6.82	5.63
2	6.18	6.56	4.42	4.90	5.89	5.02	8.44	5.92
1	4.87	4.84	4.03	4.90	5.39	4.71	8.77	5.36
Average	5.43	7.42	4.75	5.17	6.20	5.63	10.40	6.43
1	3.37	4.22	5.08	5.25	4.99	5.83	7.79	5.22
2	3.37	4.14	4.36	7.20	5.29	6.34	6.17	5.27
3	2.43	3.36	3.90	3.98	4.96	5.83	6.17	4.38
4	3.00	3.15	4.68	4.68	5.32	4.30	6.49	4.57
5	1.69	2.89	3.97	3.22	6.70	3.79	2.60	3.55
6	1.12	2.73	3.84	3.75	3.52	5.83	4.87	3.67
7	1.69	2.34	3.90	4.24	3.28	5.02	.97	3.06
8	1.50	2.97	3.06	3.45	3.01	4.71	2.92	3.09
9	1.69	1.64	2.47	2.30	2.91	1.12	1.95	2.01
10	2.25	2.26	1.95	2.52	3.52	2.15	.65	2.19
11	.75	.70	1.95	1.54	1.27	.61	.32	1.02
12	2.43	1.56	1.63	2.21	.94	1.23	-	1.43
13	.37	1.33	.78	1.19	.60	.92	-	.74
14	1.12	2.73	1.24	.62	.30	.10	.65	.97
15	2.43	1.33	1.11	.31	.57	.41	.32	.92
16	.94	.55	.59	.26	.13	.61	-	.44
17	1.12	.16	.46	.44	.07	.31	-	.37
18	.94	.94	.13	.22	.07	.20	-	.36
19	-	.16	.13	.04	.03	-	-	.05
20	.37	.39	.13	.04	.13	-	-	.15
21	.19	.16	.06	.04	.07	.10	.32	.13
22	.19	-	-	.04	-	-	-	.03
23	-	.08	-	.04	.07	-	-	.03
24	.19	-	-	-	.03	-	-	.03
25	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-
27	-	-	.06	-	-	-	-	.01
28	-	.16	-	-	-	-	-	.02
Above 29	-	.08	-	-	-	.10	-	.01